CLAIMS

What is claimed is:

1. A method comprising:

applying a flux on a substrate having solder bumps, the flux including at least a solvent and a water soluble monomer or a water soluble polymer;

placing a die on the substrate; and

reflowing the die in an oven at a reflow temperature to redistribute stress caused by coefficient thermal expansion (CTE) mismatch between the substrate and the die, the reflow temperature being higher than a melting point of the polymer.

2. The method of claim 1 wherein applying the flux comprises:

applying the flux including the water soluble polymer being one of a polyacrylic acid, a polyacrylamide, a polyvinyl alcohol, a starch, and a cellulose.

3. The method of claim 1 wherein applying the flux comprises:

applying the flux including at least an organic solvent and the water soluble monomer.

4. The method of claim 1 wherein applying the flux comprises:

applying the flux including at least an organic solvent and the water soluble polymer.

5. The method of claim 1 wherein reflowing the die comprises:

vaporizing the solvent at an increasing reflow temperature;

melting the polymer into polymer liquid; and

removing metal oxide from the solder bumps.

6. The method of claim 5 wherein reflowing the die further comprises:

melting the solder bumps;

forming solder joints from the melted solder bumps;

solidifying the solder joints at a decreasing reflow temperature; and

solidifying the polymer liquid to redistribute the stress.

7. The method of claim 1 wherein reflowing the die comprises:

vaporizing the solvent at an increasing reflow temperature;
reacting the monomer to form solid polymer;
melting the solid polymer into polymer liquid; and
removing metal oxide from the solder bumps.

8. The method of claim 7 wherein reflowing the die further comprises:
melting the solder bumps;
forming solder joints from the melted solder bumps;
solidifying the solder joints at a decreasing reflow temperature; and
solidifying the polymer liquid to redistribute the stress.

9. The method of claim 1 further comprising:
de-fluxing the die to remove polymer residue; and
dispensing an underfill material into gap between the die and the substrate.

10. The method of claim 9 wherein de-fluxing comprises:
dissolving the polymer residue by hot water.

11. A method comprising:
mixing a solvent with at least a water soluble monomer or a water soluble polymer to form a flux; and
applying the flux to a die assembly including a die and a substrate to redistribute stress caused by coefficient thermal expansion (CTE) mismatch between the substrate and the die.

12. The method of claim 11 wherein mixing comprises:
mixing the solvent with the water soluble polymer being one of a polyacrylic acid, a polyacrylamide, a polyvinyl alcohol, a starch, and a cellulose.

13. The method of claim 11 wherein mixing comprises:
mixing an organic solvent and the water soluble monomer.

14. The method of claim 11 wherein mixing comprises:
mixing an organic solvent and the water soluble polymer.

15. The method of claim 11 wherein applying the flux comprises:

reflowing the die assembly in an oven at a reflow temperature, the reflow temperature being higher than a melting point of the polymer.

16. The method of claim 15 wherein reflowing the die assembly comprises:
increasing the reflow temperature to melt the polymer into polymer liquid and to form solder joints from the solder bumps; and
decreasing the reflow temperature to solidify the solder joints and the polymer liquid.

17. The method of claim 15 wherein reflowing the die assembly comprises:
increasing the reflow temperature to react the monomer to form solid polymer and to form solder joints from the solder bumps; the solid polymer being melted into polymer liquid, and
decreasing the reflow temperature to solidify the solder joints and the polymer liquid.

18. The method of claim 11 further comprising:
de-fluxing the die assembly to remove polymer residue.

19. The method of claim 18 wherein de-fluxing comprises:
dissolving the polymer residue by hot water.

20. The method of claim 18 further comprising:
dispensing an underfill material into a gap between the die and the substrate.

21. A system comprising:
a flux dispenser to apply a flux on a substrate having solder bumps, the flux including at least a solvent and a water soluble monomer or a water soluble polymer;
a die placement assembly to place a die on the substrate ; and
a reflow oven to reflow the die at a reflow temperature to redistribute stress caused by coefficient thermal expansion (CTE) mismatch between the substrate and the die, the reflow temperature being higher than a melting point of the polymer.

22. The system of claim 21 wherein the water soluble polymer is one of a polyacrylic acid, a polyacrylamide, a polyvinyl alcohol, a starch, and a cellulose.

23. The system of claim 21 wherein the flux includes at least an organic solvent and the water soluble monomer.

24. The system of claim 21 wherein the flux includes at least an organic solvent and the water soluble monomer.

25. The system of claim 21 wherein the reflow oven vaporizes the solvent at an increasing reflow temperature, melts the polymer into polymer liquid, and removes metal oxide from the solder bumps.

26. The system of claim 25 wherein the reflow oven further melts the solder bumps, forms solder joints from the melted solder bumps, solidifies the solder joints at a decreasing reflow temperature, and solidifies the polymer liquid to redistribute the stress.

27. The system of claim 21 wherein the reflow oven vaporizes the solvent at an increasing reflow temperature, reacts the monomer to form solid polymer, melts the solid polymer into polymer liquid, and removes metal oxide from the solder bumps.

28. The system of claim 27 wherein the reflow oven further melts the solder bumps, forms solder joints from the melted solder bumps, solidifies the solder joints at a decreasing reflow temperature, and solidifies the polymer liquid to redistribute the stress.

29. The system of claim 21 further comprising:

a de-fluxing dispenser to de-flux the die to remove polymer residue; and

an underfill dispenser to dispense an underfill material into a gap between the die and the substrate.

30. The system of claim 21 wherein the de-flux dispenser dissolves the polymer residue by hot water.